PATENT SPECIFICATION

DRAWINGS ATTACHED

1,092,667

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COMPLETE SPECIFICATION

Improvements in or relating to Ball and Roller Bearings

We, COOPER ROLLER BEARINGS COMPANY LIMITED, a British Company of King's Lynn, Norfolk, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to ball and roller bearings of the type known as split bearings, that is to say bearings having one or more circular races divided by planes that extend from the inside to the outside of the race so that the race consists of two or more curved parts which are clamped together to form the circular race. Each division may be in a single plane or may have some other shape, e.g. a V-shape, curved shape, or zig-zag shape.

For many years large quantities of these bearings have been made and the only satisfactory method of production of the races has been to make the curved sections separately, clamp these together by suitable jigs and fixtures at each machining operation including grinding, and separately harden by heating and cooling. This is an expensive method especially in hours of work involved and some distortion of the separate parts takes place during heat treatment especially with the larger sizes of bearings, which have to be subsequently corrected.

We have considered the possibility of welding the race parts together for the purpose of machining and heat treatment and then separating them. This did not seem to be practicable for various reasons but we have now succeeded in developing a practical process for making the race parts in this way.

According to the invention, the method of making a race part of a split ball or roller bearing, comprises shaping the race parts from high carbon steel containing chromium, clamping the race parts in juxtaposition to each other, welding the race parts together at localised positions adjacent to the annular edges thereof by causing weld metal to weld to the parts, machining, heat treating and grinding the race, and finally cutting out the weld metal.

In an example of the invention, the method of making a race part of a ball or roller bearing comprises shaping the race parts into part-circular parts from high carbon steel containing chromium, placing the ends of a welding wire between the meeting faces of the parts adjacent the ends thereof, pressing the parts together, passing an electric current through the whole assembly which heats the ends of the welding wires and fuses the race parts to the flattened ends, the current being then switched off and the race being then machined, heat treated and ground to a finished size, and finally cutting out the weld metal to separate the parts from each other.

It is difficult to weld high carbon chromium steel at all and especially since stresses occurring during machining and heat treatment tend to cause the weld metal to break away from the race metal. This is accentuated because we do not weld across the whole of the facing surfaces but only at the ends thereof so that only a small welding area is available. We tried welding with the same metal as the race metal but this proved unsuccessful. However, by our method we can avoid metallurgical interference with the track by confining the weld to areas outside the track but the weld is found to be strong enough due to forming large enough weld areas e.g. by placing the ends of a welding wire between the meeting faces of the parts adjacent the ends thereof and by the use of pressure welding using a suitable weld metal without melting the race

metal.

The race metal may contain 0.9 to 1.20 per cent carbon, 1.0 to 1.7 per cent chromium and .3 to .75 per cent manganese by weight of the alloy. The weld metal may be mild steel containing 0.05 to 0.3 per cent carbon.

The two halves may be produced from strip by forging and then clamped in a jig and the welding effected.

The heat treatment may be effected by heating to 800-900°C (e.g. 820°C), and quenching in oil.

The race parts when welded together may be machined all over, hardened by heat treatment, ground and finally separated by sawing or grinding out the small pieces of weld metal leaving the race tracks unaffected. The race parts are slightly wider than the actual ball or roller tracks and the openings remain permanently in the finished bearing.

The inner race parts may be separated by a gap of 6 to 12 thousandths of an inch at each division when welded together. This gap is required so that when the inner race track is ground to a cylindrical shape it will fit around a shaft leaving these gaps to ensure tight clamping on the shaft.

Both inner and outer races may be made in accordance with the invention. The race parts may be made with any required formations, e.g. roller locating flanges, grooves for clamping, and holes for clamping screws.

The invention is illustrated by way of examples in the accompanying diagrammatic drawings, wherein:

Figure 1 is a view showing a method of welding in accordance with the invention: and

Figure 2 shows a method of separating the finished race parts.

Figure 1 illustrates a method of welding race parts 10, 11 together. The part 10 is placed in a fixed V-block 20 which is a water cooled copper block. The ends of mild steel copper-coated welding wire 21, 22, 23, 24 are placed on the edges or meeting faces of the part 10 and the upper part 11 is pressed down on these ends by an upper V-block 26 this also being a water-cooled copper block. The ends of the wire are actually inserted in the normal round form and become pressed to the shape shown. An electric current is then passed through the whole assembly which heats the ends of the wires. These ends are flattened by the applied pressure and the parts 10, 11 are fused to the flattened ends. The current is then switched off and the wires sheared off. The parts 10, 11 are then machined, heat treated to harden them and ground to finished size. Then the flattened weld metal is machined out by placing the parts 10, 11 on a table 27 (Figure 2), which may be magnetic and the angle of which is adjustable so that the meeting faces are in line with the plane of a thin saw or grinding wheel 28 (Figure 2) which is advanced to remove the weld metal thereby separating the parts.

In the specification of our Patent Application No. 1,001,988 we have described and claimed a method of making a race part of a split ball or roller bearing, comprising shaping the race parts from high carbon steel containing chromium, clamping the race parts in juxtaposition to each other, cutting openings at the ends of the meeting surfaces, which openings do not encroach materially on to the race track, pressing hot weld metal into the openings, the weld metal being steel of lower carbon content than that of the race parts, machining and heat treating the race, and finally cutting out the weld metal. The Claims appended herein are to be read and construed as excluding the method claimed in Patent Application No. 1,001,988.

WHAT WE CLAIM IS:

1. A method of making a race part of a split ball or roller bearing, comprising shaping the race parts from high carbon steel containing chromium, clamping the race parts in juxtaposition to each other, welding the race parts together at localized positions adjacent the annular edges thereof by causing weld metal to weld to the parts, machining, heat treating and grinding the race, and finally cutting out the weld metal, subject to the foregoing disclaimer.

2. A method of making a race part of a ball or roller bearing comprising shaping the race parts into part-circular parts from high carbon steel containing chromium, placing the ends of a welding wire between the meeting faces of the parts adjacent the ends thereof, pressing the parts together, passing an electric current through the whole assembly which heats the ends of the welding wires and fuses the race parts thereto, the current being switched off and the race being then machined heat treated and ground to a finished size, and finally cutting out the weld metal to separate the parts from each other.

3. A method of making a race part of a ball or roller bearing comprising shaping the race parts into two part-circular parts from high carbon steel containing chromium, supporting one race part in a lower water cooled copper V-block, placing the ends of a mild steel copper coated welding wire on the edges or meeting faces adjacent the ends of the one race part, the other race part being pressed in juxtaposition onto the edges of the one race part by means of an upper copper water cooled V-block, passing an electric current through the whole assembly which heats the ends of the welding wires and fuses the two race parts thereto, the current being switched off and the race being then machined, heat treated and ground to a finished size, and finally cutting out the

weld metal by means of a thin saw or grinding wheel thereby separating the race parts.

4. A method as claimed in Claim 1, 2 or 3, wherein the race parts are made from steel containing 0.9 to 1.20 per cent carbon, 1.0 to 1.7 per cent chromium, and 0.3 to 0.75 per cent manganese by weight of the alloy, and the weld metal contains 0.05 to 0.3 per cent carbon.

5. A method as claimed in Claim 1, 2 or 3, wherein the race parts are made slightly wider than the actual ball or roller tracks.

6. A method as claimed in Claim 1, 2 or 3, wherein the race parts consist of two outer part-circular parts and two inner part-circular parts within said outer parts and said inner race parts are separated from each other by a gap of 6 to 12 thousandths of an inch at each division when welded together, and the outer race parts are clamped together.

7. A method as claimed in Claim 2 substantially as described with reference to the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 1.

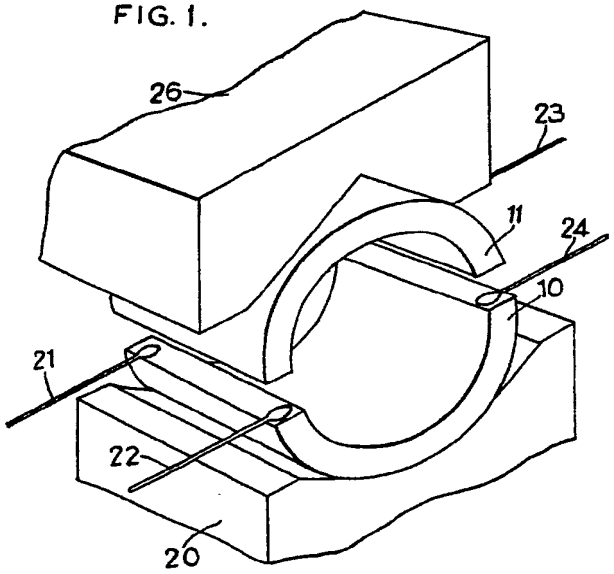

FIG. 2.